

Claims:

1. A chisel for preparing adjacent vertebrae for insertion of a spinal implant into the disc space defined by the vertebrae, the chisel comprising:
 - a shank having a longitudinal axis and distal and proximal ends; and
 - 5 a bone cutting blade attached to the shank proximal end and having a cutting edge lying in a first plane for forming a channel in one of the vertebrae, the blade extending transverse to a second plane normal to the first plane, the second plane containing the longitudinal axis, the blade having a bone cutting edge facing in a proximal direction, the cutting edge
 - 10 being non-linear in shape in top plan view and having an apex in the top plan view, the cutting edge having first and second cutting coplanar portions in the first plane, each first and second edge portion tapering toward the proximal direction .
- 15 2. The chisel of claim 1 wherein the cutting edge first and second portions taper toward each other terminating at the apex.
3. The chisel of claim 1 wherein the first and second portions of the blade are symmetrical relative to the axis and the apex lies on the axis.
- 20 4. The chisel of claim 1 wherein the shank at the proximal end is solid with a rectangular cross section, the shank having peripheral top and bottom surfaces and peripheral first and second side surfaces, further including a chisel guide member one piece with and fixedly secured to the shank and

extending from the shank proximal end coextensive with said outer side surfaces juxtaposed with and beyond the blade apex.

5. The chisel of claim 4 wherein the blade has a top surface that is coextensive and coplanar with the shank top surface and a cutting edge that tapers distally toward the shank and toward the guide member.
6. The chisel of claim 1 including two of said blades spaced apart so that each blade is positioned to remove bone from a different vertebra of the two adjacent vertebrae.
7. The chisel of claim 6 wherein the two blades are symmetrical relative to each other.
- 15 8. The chisel of claim 1 wherein the shank has peripheral top and bottom surfaces, further including a projection extending at least from one of the top and bottom surfaces and spaced distally from the blade edge for abutting adjacent vertebrae during use of the chisel to limit the depth of penetration of the chisel into said vertebrae disc space.
- 20 9. The chisel of claim 8 wherein the projections each comprise a portion of a pin inserted in a through bore in the shank.
10. The chisel of claim 1 wherein the shank has a groove and a shoulder adjacent to the distal end thereof, further including a handle attached to the

shank distal end and including a quick release sleeve arranged to be releasable secured to the groove and shoulder.

11. The chisel of claim 10 wherein the sleeve includes a pin for mating with
5 the shoulder to preclude relative rotation of the sleeve and handle to the shank.

12. The chisel of claim 10 wherein the handle includes a shaft portion with a plurality of balls arranged in annular array about the shaft portion for radially
10 displacement in corresponding bores, the sleeve having a stepped bore having first and second segments for receiving the shaft portion along said axis, the first segment for allowing the balls aligned therewith to be radially aligned with and external said groove in a first axial position of the sleeve to permit the shank to be disengaged from the shaft portion and the second
15 segment for urging the balls into said groove in a second axial position to releasably lock the shaft portion to the shank.

13. The chisel of claim 11 including a resilient member coupled to the sleeve for resiliently urging the sleeve to a quiescent second position to
20 normally lock the handle to the shank in the quiescent second position.

14. The chisel of claim 13 wherein the shaft portion and the sleeve have juxtaposed spaced shoulders, the resilient member comprising a spring between and abutting said shoulders.

15. The chisel of claim 1 including a pair of said blade in juxtaposed spaced relation, each blade of the pair for removing bone from a different one of the adjacent vertebrae.

5

16. The chisel of claim 1 wherein the shank has a hollow core at said proximal end facing in said proximal direction, further including a chisel guide member movably attached to the shank for selectively extending from the core in a direction toward the proximal end and retracting into the core in a 10 direction toward the distal end.

17. The chisel of claim 16 wherein said guide member has a through slot, the shank including a pin fixed to the guide and movably attached to the shank in said slot so that the guide member can axially displace in said core 15 in opposite directions along the longitudinal axis toward and away from the proximal end.

18. The chisel of claim 17 wherein the pin protrudes from the shank to provide a visual indication of the depth of penetration of the chisel into the 20 vertebral disc space and provides depth limit means for abutting at least one of the vertebrae forming a stop for the chisel.

19. The chisel of claim 16 including guide member displacement means for selectively manually respectively extending and retracting the guide member from and into the core.
 - 5 20. The chisel of claim 19 wherein said displacement means comprises a first elongated member attached to the guide member and having a portion extending into the handle, and a rod displacement arrangement coupled to the elongated member portion for axially displacing the first rod toward and away from the proximal end.
- 10
21. The chisel of claim 20 wherein the rod is releasably attached to the guide member.
 22. The chisel of claim 21 including threads for rotationally coupling the rod
15 to the guide member, and a knob connected to the rod for rotating the rod relative to the guide member, the knob having a fixed axial position on the handle such that rotation of the knob displaces the guide member via the threaded engagement of the rod to the guide member.
 - 20 23. The chisel of claim 22 wherein the knob is keyed to the rod to rotate the rod with rotation of the knob.
 24. The chisel of claim 23 wherein the handle has a slot receiving the knob, the received knob for manual engagement by a thumb.

25. The chisel of claim 1 wherein the shank at the proximal ends has at least one through slot for receiving bone chips during use of the chisel.

5 26. The chisel of claim 20 wherein the rod displacement means includes a transversely extending elongated member attached to the first rod at the first rod end distal the guide member and detent means attached to the handle for receiving the elongated member for selectively releasably securing the elongated member in guide member retracted and extended positions.

10

27. The chisel of claim 26 wherein the detent means comprises a slot in the handle for receiving the elongated member, the slot having first and second axially spaced channels each for selectively receiving the elongated member.

15

28. The chisel of claim 27 including a sleeve over the handle at the slot including a further slot juxtaposed with the handle slot

29. A chisel for preparing adjacent vertebrae for insertion of a spinal implant
20 into the disc space defined by the vertebrae, the chisel comprising:
a shank, the shank having a longitudinal axis and having distal and proximal ends, the proximal end having top and bottom surfaces and opposing first and second side surfaces; and

first and second juxtaposed spaced bone cutting blades, each blade having a cutting edge lying in a first plane at the shank proximal end in a plane parallel to the respective top and bottom surfaces, each blade edge facing in a proximal direction and extending transverse to the longitudinal axis in the first plane from the first side surface to the opposing second side surface, the edges or a tangent thereto each lying in a second plane normal to the first plane, the second plane being inclined relative to the axis and relative to the opposing side surfaces in a direction toward the proximal end, the edges each having a portion in which the tangent thereto intersects a second side surface in top plan view at an acute angle.

30. The chisel of claim 29 wherein the shank has a hollow core and including a guide member movably secured to the shank in the core and having a first retracted position located within the shank core and a second extended position extending beyond the shank at the proximal end for abutting adjacent vertebrae in the disc space during use.

31. The chisel of claim 29 including a pin passing through an axially extending slot in the shank and through the guide member for limiting the axial displacement of the guide member.

20

32. The chisel of claim 30 wherein the pin protrudes from the shank to provide a visual indication of the depth of penetration of the chisel into the vertebral disc space and to provide depth limit means for abutting at least one of the vertebrae forming a stop for the chisel during use.

33. The chisel of claim 29 including guide member displacement means for selectively manually respectively extending and retracting the guide member from and into the core.

5

34. The chisel of claim 29 further including a handle secured to the shank distal end and wherein said guide member displacement means comprises a first rod attached to the guide member and having a rod portion extending into the handle, and a rod displacement arrangement coupled to the rod 10 portion for axially displacing the first rod toward and away from the proximal end.

35. The chisel of claim 34 wherein the rod is releasably attached to the guide member.

15

36. The chisel of claim 35 including threads for rotationally coupling the rod to the guide member, and a knob connected to the rod for rotating the rod relative to the guide member, the knob having a fixed axial position on the handle such that rotation of the knob displaces the guide member via the 20 threaded engagement of the rod to the guide member.

37. The chisel of claim 36 wherein the knob is keyed to the rod to rotate the rod with rotation of the knob.

38. The chisel of claim 37 wherein the handle has a slot receiving the knob, the received knob for manual engagement by a thumb.

39. The chisel of claim 29 wherein the shank at the proximal ends has at 5 least one through slot for receiving bone chips during use of the chisel.

40. The chisel of claim 34 further including a handle secured to the shank distal end wherein the rod displacement means includes a transversely extending second rod attached to the first rod at the first rod end distal the 10 guide member and detent means attached to the handle for receiving the second rod for selectively releasably securing the second rod in guide member retracted and extended positions.

41. The chisel of claim 40 wherein the detent means comprises a slot in the 15 handle for receiving the second rod, the slot having first and second axially spaced channels each for selectively receiving the second rod.

42. The chisel of claim 41 including a sleeve over the handle at the slot including a further slot juxtaposed with the handle slot

20

43. In a method for preparation of a disc space for insertion of a spinal implant into the disc space between adjacent vertebrae, the steps comprising:

initially removing a first portion of at least one of two adjacent vertebrae of the disc space with a first chisel with an extended guide member to form at least one partial channel in the at least one vertebra, the guide member for bearing against the adjacent vertebrae and guiding the
5 chisel during the removing; and then

removing a further deeper second portion of the at least one adjacent vertebrae with a second chisel guided by first channel portion, the second chisel having no guide member, to form the at least one partial channel into at least one complete channel for receiving a spinal implant inserted into the
10 disc space, the further portion being aligned with and extending said at least one channel to a depth into the disc space an amount sufficient to form said complete channel.

44. The method of claim 43 including forming said at least one partial
15 channel and said at least one complete channel in each of said adjacent vertebrae with the same chisel.

45. The method of claim 44 wherein said removing a further portion of the at least one adjacent vertebrae with a second chisel includes retracting the
20 guide member of the first chisel into the first chisel to form the first chisel into the second chisel.

46. The method of claim 43 wherein said removing a further portion of the at least one adjacent vertebrae with a second chisel includes removing the first

chisel from the formed at least one partial channel in the at least one vertebra and then inserting the second chisel into the formed at least one partial channel wherein the at least one partial channel guides the second chisel during the insertion.

5

47. The method of claim 46 further including the steps of:

performing a discectomy on the disc space;

distracting the disc space at a first side of the spinal column;

removing disc material from the disc space on the contralateral side of

10 the disc space opposite the first side and preparing the end plates of the vertebrae with a rotating scraper at the contralateral side;

performing the steps of claim 45 on the prepared end plates of the contralateral side;

determining the height of the disc space between the channels in the

15 adjacent vertebrae for determining the associated implant size to be inserted into the disc space;

inserting the implant into the formed channels and disc space on the contralateral side of the disc space;

removing the distractor; and

20 repeating the above steps on the first side of the disc space.

48. A chisel for preparing adjacent vertebrae for insertion of a spinal implant into the disc space defined by the vertebrae, the chisel comprising:

a handle;

a shank having a longitudinal axis and distal and proximal ends, the handle being secured to the distal end; and

a pair of bone cutting blades attached to the shank proximal end, each blade having a cutting edge lying in a plane for forming a channel in a different one of the adjacent vertebrae, the blades extending transverse to the longitudinal axis with their bone cutting edges facing in a proximal direction;

the shank at the proximal end being solid with a rectangular cross section, the shank having peripheral top and bottom surfaces and peripheral first and second side surfaces, further including a solid rectangular chisel guide member one piece with and fixedly secured to the shank and extending from the shank proximal end coextensive with said peripheral side surfaces and juxtaposed with and beyond each of the blades.

15 49. The chisel of claim 48 wherein the blades each have at least a portion that extends in a direction transverse to and at an acute angle to the longitudinal axis in top plan view and juxtaposed in mirror image relation.

50. A chisel for preparing adjacent vertebrae for insertion of a spinal implant
20 into the disc space defined by the vertebrae, the chisel comprising:
a handle;
a shank having a longitudinal axis and distal and proximal ends, the handle being secured to the distal end;

a pair of bone cutting blades attached to the shank proximal end, each blade having a cutting edge lying in a plane for forming a channel in a different one of the adjacent vertebrae, the blades extending transverse to the longitudinal axis with their bone cutting edges facing in a proximal

5 direction;

the shank at the proximal end having a hollow core;

a chisel guide member movably secured to the shank in the core having extended and retracted states for being selectively juxtaposed with and beyond each of the blades in the extended state for bearing against the
10 adjacent vertebrae and for withdrawing into the core in a retracted state; and means coupled to the handle for selectively retracting and extending the guide member to the respective retracted and extended states.

51. The chisel of claim 50 wherein the means for selectively retracting and
15 extending includes a rod connected to the guide member in the core for axially displacing the guide member along the longitudinal axis of the shank, and a handle member secured transversely to the rod at a rod end distal the guide member and extending beyond the handle for manual gripping.

20 52. The chisel of claim 51 including detent means for releasably holding the handle member in the retracted and extended states.

53. The chisel of claim 52 wherein the detent means comprises a longitudinal slot in the handle and circumferential detent grooves axially

spaced in communication with the slot for selectively rotatably receiving the handle member.

54. The chisel of claim 50 wherein the means for selectively retracting and extending includes a rod threaded to the guide member and located in the core for axially displacing the guide member along the longitudinal axis of the shank, and a knob rotatably secured to the shank and secured to the rod distal the guide member for rotating the rod threads relative to the guide member threads to thereby displace the guide member during the rotation of 10 the rod.

55. The chisel of claim 54 wherein the handle has a slot, the knob being located in the slot.

15 56. A chisel for preparing adjacent vertebrae for insertion of a spinal implant into the disc space defined by the vertebrae, the chisel comprising:
a handle;
a shank having a longitudinal axis and distal and proximal ends, the handle being secured to the distal end; and
20 a bone cutting blade attached to the shank proximal end and having a linear cutting edge for forming a channel in one of the vertebrae, the blade having at least one portion inclined to the longitudinal axis and having a bone cutting edge facing in a proximal direction, the blade terminating at a point in top plan view.

57. The chisel of claim 1 further including a handle attached to the shank distal end.

5 58. The chisel of claim 1 further including a handle releasably attached to the shank distal end.